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Wisconsin Department of Commerce

Safety & Buildings Division
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Evaluation # 200434-W (Replaces 990041-W)

Wisconsin Building Products Evaluation

Material	TJL™, TJW™, TJS™, TJM™ and TJH™ Open-Web Truss Series
Manufacturer	Trus Joist, A Weyerhaeuser Business PO Box 8449 Boise, Idaho 83707

SCOPE OF EVALUATION

GENERAL: This report evaluates the use of the TJL™, TJW™, TJS™, TJM™ and TJH™ Open-web trusses, manufactured by Trus Joist, A Weyerhaeuser Business for use as structural engineered floor and roof trusses.

Comm requirements below in accordance with the current **Wisconsin Uniform Dwelling Code for 1 & 2 family dwellings:**

- **Structural:** The TJL™, TJW™, TJS™, TJM™ and TJH™ Open-web trusses were evaluated for use in dry locations for use as floor and roof trusses in accordance with **s. Comm 21.02(3)(a)2.** and **s. Comm 21.19**.

The **IBC** requirements below in accordance with the current **Wisconsin Amended ICC Code:**

- **Structural:** The TJL™, TJW™, TJS™, TJM™ and TJH™ Open-web trusses were evaluated for use in dry locations for use as floor and roof trusses in accordance with **ss. IBC 2303.1.2.**

DESCRIPTION AND USE

The **TJL** Open-Web Truss Series is an open web wood and steel truss of a custom designed Warren truss configuration. Chord material consists of single (laid flat-wise) 2x4 nominal sawn lumber, which is both visually and machine-stress-rated (MSR), Microllam® LVL lumber or TimberStrand® LSL lumber. The sawn lumber is end-jointed with structural finger joints as required. Web members are 1-inch or 1-1/8-inch diameter cold formed steel tubing of various gages conforming to ASTM A 500, Grade B, with the exceptions noted in the Trus Joist Open-Web Truss Manufacturing Standard. The web ends are die-stamped to fit into a rout in the chord members and to connect with steel pins. The steel pins are 5/8-inch or 3/8-inch diameter as required by design, and are pressed through drilled holes in the chord members, and the die punched holes in the web members. Steel bearing clips are provided at all points of support as well as points of heavy concentrated loading. Bridging for the **TJL** system is attached to factory installed bridging clips.

The **TJL** series is manufactured in parallel chord, tapered (single pitch) and pitched (double pitch) profiles. Truss depths range from 14-inches minimum to 40-inches maximum for the parallel chord profile, and to 50-inches maximum for tapered and pitched profiles. Camber is provided as specified. Bearing can be designed for top chord support, bottom chord support or a combination thereof. Spans range from 12-feet through 70-feet for the parallel chord profile. The parallel, tapered and pitched profiles may be sized using the parallel, tapered or pitched load tables published by the manufacturer.

The **TJW** Open-Web Truss Series is an open web wood and steel truss of a custom designed Warren truss configuration. Chord material consists of single (laid flat-wise) 2x6 nominal sawn lumber cut to a net width of 4-3/4-inches, which is both visually and machine-stress-rated (MSR) or TimberStrand® LSL lumber. The sawn lumber is end-jointed with structural finger joints as required. Web members are 1-inch or 1-1/8-inch diameter cold formed steel tubing of various gages conforming to ASTM A 500, Grade B, with the exceptions noted in the Trus Joist Open-Web Truss Manufacturing Standard. The web ends are die-stamped to fit into a rout in the chord members and to connect with steel pins. The steel pins are 5/8-inch or 3/8-inch diameter as required by design, and are pressed through drilled holes in the chord members, and the die punched holes in the web members. Steel bearing clips are provided at all points of support as well as points of heavy concentrated loading. Bridging for the **TJW** system is attached to factory installed bridging clips.

The **TJW** Series is manufactured in parallel chord, tapered (single pitch) and pitched (double pitch) profiles. Depths range from 14-inches minimum to 40-inches maximum for parallel chord profile and to 50-inches maximum for tapered and pitched profiles. Camber is provided as specified. Bearing can be designed for top chord support, bottom chord support or a combination thereof. Spans range from 12-feet through 70-feet for the parallel chord profile.
The parallel, tapered and pitched profiles may be sized using the parallel, tapered or pitched load tables published by the manufacturer.

The **TJS** Open-Web Truss Series is an open web wood and steel truss of a custom designed Warren truss configuration. Chord material consists of double (placed on edge) 1.5 inch wide by 2.3 inch deep Microllam® LVL lumber. The tension chords are continuous without finger joints, and compression chords may contain finger joints. Web members are 1-1/2 inch or 1-1/4 inch diameter cold formed steel tubing of various gages conforming to ASTM A 500, Grade B, with the exceptions noted in the Trus Joist Open-Web Truss Manufacturing Standard. The web ends are die-stamped to fit between the double chord members and to connect with steel pins. The steel pins are 1/2-inch or 3/4-inch diameter as required by design, and are pressed through drilled holes in the chord members, and the die punched holes in the web members. Steel bearing clips are provided at all points of support as well as points of heavy concentrated loading. Bridging for the **TJS** system is attached to factory installed bridging clips.

The **TJS** series is manufactured in parallel chord, tapered (single pitch) and pitched (double pitch) profiles. Truss depths range from 16-inches minimum to 48-inches maximum for parallel chord profiles, 64-inches maximum for tapered and 84-inches maximum for pitched profiles. Camber is provided as specified. Bearing can be designed for top chord support, bottom chord support, or a combination thereof. Spans range from 20-feet through 70-feet. The parallel, tapered and pitched profiles may be sized using the parallel, tapered or pitched load tables published by the manufacturer.

The **TJM** Open-Web Truss Series is an open web wood and steel truss of a custom designed Warren truss configuration. The chord material is double (placed on edge) 2x4 nominal sawn lumber which is both visually and machine-stress-rated (MSR), or Microllam® LVL lumber. The sawn lumber is end-jointed with structural finger joints as required. Web members are 1-1/2 inch, 1-3/8 inch or 1-1/8-inch diameter cold formed steel tubing of various gages conforming to ASTM A 500, Grade B, with the exceptions noted in the Trus Joist Open-Web Truss Manufacturing Standard. The web ends are die-stamped to fit between the double chord members and to connect with steel pins. The steel pins are 1-inch or 5/8-inch diameter as required by design, and are pressed through drilled holes in the chord members, and the die punched holes in the web members. Steel bearing clips are provided at all points of support as well as points of heavy concentrated loading. Bridging for the **TJM** system is attached to factory installed bridging clips.

The **TJM** series is manufactured in parallel chord, tapered (single pitch) and pitched (double pitch) profiles. Depths

range from 20-inches minimum to 46-inches maximum for parallel chord profile and to 60-inches and 72-inches maximum depths for the tapered and pitched profiles respectively. Camber is provided as specified. Bearing can be designed for top chord support, bottom chord support or a combination thereof. Spans range from 22-feet through 70-feet for the parallel chord profile. The parallel, tapered and pitched profiles may be sized using the parallel, tapered or pitched load tables published by the manufacturer.

The **TJH** Open-Web Truss Series is an open web wood and steel truss of a custom designed Warren truss configuration. Chord material consists of double (placed on edge) 2x6 nominal sawn lumber, which is both visually and machine-stress-rated (MSR), or Microllam® LVL lumber. The sawn lumber is end-jointed with structural finger joints as required. Web members are 2 inch or 1-1/2 inch diameter cold formed steel tubing of various gages conforming to ASTM A 500, Grade B, with the exceptions noted in the Trus Joist Open-Web Truss Manufacturing Standard. The web ends are die-stamped to fit between the double chord members and to connect with steel pins. The steel pins are 1-1/4-inch or ¾ inch diameter as required by design, and are pressed through drilled holes in the chord members, and the die punched holes in the web members. Steel bearing clips are provided at all points of support as well as points of heavy concentrated loading. Bridging for the **TJH** system is attached to factory installed bridging clips.

The **TJH** series is manufactured in parallel chord, tapered (single pitch) and pitched (double pitch) profiles. Depths range from 24-inches minimum to 63-inches maximum for parallel chord profile and to 72-inches and 114-inches maximum depths for the tapered and pitched profiles respectively. Camber is provided as specified. Bearing can be designed for top chord support, bottom chord support or a combination thereof. Spans range from 30-feet through 70-feet for the parallel chord profile. The parallel, tapered and pitched profiles may be sized using the parallel, tapered or pitched load tables published by the manufacturer.

TESTS AND RESULTS

A complete series of tests were performed to confirm theoretical analysis and to develop design criteria. Test information will be retained on file.

Allowable Chord Stresses:

The allowable chord stresses for 100% duration of load are given in Table 1. The allowable web member tension and bearing loads are given in Table 2. The allowable pin bearing loads on the chord members are given in Table 3

TABLE 1 – ALLOWABLE CHORD STRESSES (pounds-per-square-inch)

Chord Material	Truss Profile (2)	Tension TJL			Tension TJH, TJM, TJS		Tension TJW			Compression Parallel to Grain, TJL, TJH, TJM, TJS		Compression Parallel to Grain TJW			Extreme Fiber in Bending	MOE X 10^6
		At PP (1)		Other	At PP (1)	Other	At PP (1)		Other	At PP (1)	Other	At PP (1)		Other		
		3/8" Pin	5/8" Pin				3/8" Pin	5/8" Pin				3/8" Pin	5/8" Pin			
Microllam LVL	All Profiles	2300 (3)	2300 (3)	2100	2300 (3)	2100	NA	NA	NA	3000	2550	NA	NA	NA	3000 (4)(6)	2.06
2100f 1.8E (5)	Par & T	1945	1860	1575	1600	1460	1850	1765	1575	1700	1700	2100	1940	1700	2100 (6)	1.8
	P	1850	1765	1575	1600	1460	1760	1675	1575	1700	1700	2100	1940	1700	2100 (6)	
2400f 2.0E (5)	Par & T	2250	2150	1925	1925	1650	2140	2040	1925	1925	1925	2430	2245	1925	2400 (6)	2.0
	P	2140	2045	1925	1925	1650	2035	1940	1925	1925	1925	2430	2245	1925	2400 (6)	
2700f 2.2E (5)	Par & T	2550	2440	2200	2200	1900	2425	2315	2150	2500	2500	2760	2550	2200	2700 (6)	2.2
	P	2425	2320	2200	2200	1900	2305	2200	2150	2500	2500	2760	2550	2200	2700 (6)	
Timber-Strand LSL	All Profiles	1610	1610	1610	NA	NA	1610	1610	1610	2090 (7)	2090 (7)	2090	2090	2090	2620 (8)	1.55
		2050	2050	2050	NA	NA	2050	2050	2050	2580 (7)	2580 (7)	2580	2580	2580	2910 (8)	1.7

1. At PP is used at drilled areas.
2. Par = parallel profile. T = tapered profile. P = pitched profile.
3. For panel point spacing less than 24 inches on center, tension stress shall be reduced to 2100 psi.
4. 3000 psi is established for a 12 inch deep member. When used on edge values for other depths should be adjusted by multiplying by

$(12/d)^{0.136}$.

5. Species used are Douglas fir-larch, southern pine, hem-fir, spruce-pine-fir, and Englemann spruce-lodgepole pine.
6. Stress shown is for chord material used on edge. When loaded flatwise, F_b is permitted to be increased 18 percent.
7. TJL only.
8. Value shown is for thicknesses up to 3-1/2 inches.

TABLE 2 – ALLOWABLE LOAD ON WEB MEMBERS (pounds)[1]

Tube Dia. (in.)	Ga.	Wall Thick-ness (in.)	Load Cond.	Open-Web Truss Series									
				TJL		TJW		TJS		TJM		TJH	
				3/8" Pin (L/r)	5/8" Pin (L/r)	3/8" Pin (L/r)	5/8" Pin (L/r)	1/2" Pin (L/r)	3/4" Pin (L/r)	5/8" Pin (L/r)	1" Pin (L/r)	3/4" Pin (L/r)	1-1/4" Pin (L/r)
1.0	20	0.035	Tension Bearing	900 900 (43")	1100 900 (43")								
1.0	19	0.042	Tension Bearing	1350 1300 (39")	1550 1550 (35")	1350 1300 (39")	1550 1550 (35")	2080 2080 (16")					
1.0	18	0.049	Tension Bearing	1550 1520 (39")	1850 1800 (35")	1550 1520 (39")	1850 1800 (35")						
1.0	16	0.065	Tension Bearing	2100 2000 (38")	2450 2370 (35")	2100 2000 (38")	2450 2370 (35")						
1.0	14	0.083	Tension Bearing		3400 3025 (34")		3400 3025 (34")						
1-1/8	16	0.065	Tension Bearing	2250 2250 (43")	2550 2680 (39")	2250 2250 (43")	2550 2680 (39")			3290 2630 (37")			
1-1/8	13	0.095	Tension Bearing		3800 3800 (39")		4200 4200 (36")						
1-1/4	19	0.042	Tension Bearing					2080 2080 (36")	2600 3120[2]				
1-1/4	16	0.065	Tension Bearing					3215 3215 (36")	3900 4825[2]				
1-1/4	14	0.083	Tension Bearing					4110 4110 (35")	4855 6160[2]				
1-3/8	16	0.065	Tension Bearing							3290 3290 (45")	3740 3290 (45")		
1-1/2	16	0.065	Tension Bearing					3215 3215 (52")	4035 4825 (27")	3290 3290 (53")	4430 3550 (50")	3950 3160 (55")	
1-1/2	14	0.083	Tension Bearing					4110 4110 (51")	5155 6160 (27")		5530 4430 (51")		
1-1/2	13	0.095	Tension Bearing								6240 4990 (51")		
2.0	16	0.065	Tension Bearing									3950 3950 (77")	6325 5060 (64")
2.0	14	0.083	Tension Bearing									5050 5050 (76")	7950 6360 (65")
2.0	13	0.095	Tension Bearing									5770 5770 (76")	9000 7200 (66")

1. Allowable load values for web members in compression shall not exceed the above Table values and shall be further reduced where L/r controls or where allowable wood bearing controls as set forth in Table 3.
2. L/r controls at any manufactured length.

TABLE 3 – ALLOWABLE PIN BEARING LOADS ON CHORD MEMBERS[1]

Chord Material	Angle of Load to Grain	Allowable Load (pounds)									
		TJL		TJW		TJS		TJM		TJH	
		Pin Diameter, inches									
		3/8	5/8	3/8	5/8	½	¾	5/8	1	¾	1-1/4
MSR[2]	Perpendicular	800	860	855	1,075	NA	NA	970	1,300	1,080	1,620
	Parallel[3]	1,350	2,940	1,975	3,990	NA	NA	2,500	4,800	3,360	6,040
Microllam LVL	Perpendicular	500	500	NA	NA	1,130	1,130	1,560	1,695	1,795	2,315
	Parallel[3]	1,200	1,850	NA	NA	1,910	3,940	2,940	5,620	3,940	6,380
1.55E TimberStrand LSL	Perpendicular	850	850	940	1,200	NA	NA	NA	NA	NA	NA
	Parallel[3]	980	2,300	1100	3,120	NA	NA	NA	NA	NA	NA
1.7E TimberStrand LSL	Perpendicular	875	905	1240	1370	NA	NA	NA	NA	NA	NA
	Parallel[3]	1825	2940	2060	4145	NA	NA	NA	NA	NA	NA

1. Values are permitted to be increased for duration of load up to 133%.
2. Values are for Douglas fir-larch, southern pine, hem-fir, spruce-pine-fir, and Englemann spruce-lodgepole pine (1.8E or higher).
3. Parallel values are valid for end distances of 9 inches or greater for TJL and TJW Open-Web trusses and 12 pin diameters or greater for TJS, TJM and TJH trusses.

COMMENTS: The Open-Web Trusses are custom-designed using the above criteria for each application. Design analysis is based on the load specified for the application and material use is optimized based on design stresses.

Analysis is normally done with an in-house computer program developed by Trus Joist for this specific purpose. Basic analysis is the same as for a pin-jointed truss.

Where bearing assemblies are eccentric, the stresses introduced by the eccentricity are included in chord member analysis. Top chords are analyzed for combined bending and axial stresses. Truss deflection is determined by the method of virtual work.

LIMITATIONS OF APPROVAL

GENERAL: The limitations below are in accordance with the current **Wisconsin Uniform Dwelling Code for 1- & 2-family dwellings**, and the **IBC** in accordance with the current **Wisconsin Amended ICC Code:**

Load tables for the TJL, TJW, TJS, TJM and TJH series of Open-Web Trusses are on file with the Department. The load tables may be used without submittal of calculations provided that the following information is shown on the plans submitted for an individual project: Material Approval Number, truss series number identification, spans, spacing and load conditions, bearing conditions and details, other information required by **s. COMM 20.18** and **s. COMM 61.60(1)** of the **Wisconsin Uniform Dwelling Code for 1- & 2-family dwellings** and the **IBC Wisconsin Amended ICC Code**, respectively.

Approval is granted for uniformly loaded simple span applications and for cantilever conditions at both or either end which do no exceed 1/3 of the main span length. Load tables as indicated are approved for floor and roof applications.

Any variation will require submittal of calculations for that portion of the project when required by **s. COMM 20.18** or **s. COMM 61.60(1)**. Further, applications not covered by this approval and requiring special considerations may be handled by contacting a Trus Joist representative.

The design properties are for dry-use conditions and under no circumstances shall the trusses be permanently exposed to the weather.

Trus Joist's descriptive literature indicating joist composition, dimensions, installation details including locations and details of blocking, bridging, and this approval must be furnished upon request to code authorities having jurisdiction.

Identification: All TJL, TJW, TJS, TJM and TJH Open Web Trusses shall be identified by means of a stamp indicating the manufacturer's name and/or trademark, plant number, joist series, model code acceptance identification and third-party inspection agency name and/or trademark, as required by **s. COMM 20.18** and **s. COMM 61.60(1)** of the **Wisconsin Uniform Dwelling Code for 1- & 2-family dwellings** and the **IBC Wisconsin Amended ICC Code**, respectively.

This approval will be valid through December 31, 2009, unless manufacturing modifications are made to the product or a re-examination is deemed necessary by the department. The product approval is applicable to projects approved under the current edition of the applicable codes. This approval may be void for project approvals made under future applicable editions. The Wisconsin Building Product Evaluation number must be provided when plans that include this product are submitted for review.

DISCLAIMER

The department is in no way endorsing or advertising this product. This approval addresses only the specified applications for the product and does not waive any code requirement not specified in this document.

Revision Date:
Approval Date: January 26, 2005 By: _____

Lee E. Finley, Jr.
Product & Material Review
Integrated Services Bureau